

swollen. A spinneret forms the opening of the large tubular outlets of the caudal glands.

The inconspicuous excretory pore is located halfway back to the nerve-ring. Vulva slightly raised, vagina leading in at right angles; female apparatus amphidelphic, ovaries reflexed. Three to four eggs, each about as long as the body is wide and two-thirds as wide as long, are contained in each uterus. The egg shell ($1-2\mu$ thick) seems to be smooth.

The male has two equal, rather flatly arcuate spicula, about two-thirds as long as the tail; they taper throughout their length. A double gubernaculum is about one-fourth as long as the spicula and a telamon slightly longer. The single tubular supplement ($65 \times 15\mu$) is located about twice the length of the spicula in front of the anus. Its length is about one-third the corresponding body width and it forms an angle of about 45° with the body axis. About one hundred posteriorly continuous oblique copulatory muscles (about 12μ wide) occur for a distance in front of the anus equal to 2-3 times the length of the tail. A few are located behind the anus.

	0.3	4.	10.	$18'53. '18$	96.6	
♀						8.8 mm.
	1.	1.5	1.6	1.9	1.3	
♂						8.33 mm.
	0.4	5.	12.	M	97.1	
	0.9	1.4	1.4	2.2	1.4	

Habitat.—Kennebunk Port, Maine, and in oyster bed, Atlantic City, New Jersey.

Diagnosis.—*Enoplus* resembling *E. brevis* Bastian, 1865, but differing from it by larger size (8-9 mm. instead of 4.-5.5 mm. in *E. brevis*), by a slightly shorter tail in the female, by regularly tapering spicula and by a more slender and smaller preanal supplement in the male.

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ZOOLOGY.—*Notes on certain pycnogonids including descriptions of two new species of Pycnogonum*.¹ WALDO L. SCHMITT, U. S. National Museum.

Along with various collections of invertebrates received at the National Museum, there are a number of pycnogonids which seem worthy of record. Included are two apparently new species of *Pycno-*

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gonum, *P. rickettsi* and *P. hancocki*. The first of these new species comes from Pacific Grove, Monterey Bay, California, where it was collected by the donor, Mr. E. F. Ricketts, owner and director of the Pacific Biological Laboratories. The second was taken in the Galapagos Islands in the course of the recent survey of that zoologically unique group of islands by Captain G. Allan Hancock, of Los Angeles and Santa Maria, California, sponsor and leader of the Hancock Galapagos Expedition of 1933. This second new species is here published in advance of the more complete account of the results of the expedition in order to make this interesting find known without delay.

***Pycnogonum rickettsi*, new species**

So far as I am aware, this is the first reticulated *Pycnogonum* found in the northern hemisphere. The proboscis is nearly as long as the first three trunk segments taken together, and is about half as wide as long.

Measured across the crurigers the first trunk segment is almost twice as wide as long in the median line; the width across the crurigers of the third segment is equal to the length of the first two segments, the width of the second segment is intermediate between the first and third. The first segment is about as long as the second and half the third taken together; the third is less than half the first in length and from two-thirds to three-fourths the length of the second.

The abdomen is a little longer than the fourth segment and the fused portion of the crurigers forming part of it taken together; it extends posteriorly as far as the first coxae of the last, fourth, pair of legs and its width is approximately equal to half its length.

The oculiferous tubercle arises a little behind the anterior margin of the segment; it is cylindrical, more or less rounded above, with the suggestion of a small "granular" tip or apex, and carries no accessory spines or tubercles either before or behind; the eye spots are faintly marked, of just slightly deeper and darker color than the body, and not at all as conspicuous as in the drawing. On the "neck" of the first segment in line behind the oculiferous tubercle is a stout conical, somewhat apically pointed spine, which is perhaps half again as high as the oculiferous tubercle; similar but stronger spines top the second and third segments, that on the second is the largest of the three. The third is intermediate in size between the first and second; the dorsum of the small triangular portion of the fourth segment proper is but slightly convexly raised medially, forming in some specimens more than in others a low, blunt, rounded and rather inconspicuous eminence.

The lateral processes of the body or crurigers are subequal to the first coxae in length, except that the first pair are a little longer than the corresponding coxae and the last pair, which bulk less than half, or only a third the size of the subjoined coxae. Each cruriger is armed at the middle of its upper distal margin with a well formed small spine or conical tubercle; these spines or tubercles decrease in size and height from last to first; the first are very small yet distinct and noticeable, the last pair are stouter and less spine-like; the others are intermediate in size and form. Similar stouter and larger tubercles are located on the distal margin of the first coxae of corresponding ambulatory legs; those on the first coxae of the last or fourth legs, are each

somewhat curved backward and outward; those on the first coxae of the third legs are less curved than those on the fourth pair and like the spines or tubercles topping the crurigers, they also decrease in size and prominence back to front; but individually each pair is slightly larger and stouter than the corresponding spines on the crurigers.

The second and third coxae of the ambulatory legs are without any particular armature; they are swollen or expanded distally, the first coxae of each leg appear somewhat nodulose, in dorsal view at least. All of the joints of the walking legs are roughened, more or less tubercular-granulate on the upper or outer surface; above, the distal margin of the femoral and first tibial joints are armed each with a pair of juxtaposed, stout, conical, lumpy, tubercles, the tibial pair of which is smaller than the femoral; similarly placed on the second tibial joint is an inconspicuous pair of small tubercles or nodules; between each of these several pairs of tubercles or nodules on the femoral and tibial joints arises a stout seta or hair.

In length the second tarsal joint of the third right leg about equals the second tibial joint and the first tarsal taken together; the terminal claw is about half, more or less, the length of the second tarsal joint; beneath, the first and second tarsal joints have a fairly dense fringe or multiple row of short spinules; similar spinules fewer in number and less definitely in rows occur on the under side of the second tibial joint; and some few scattered spinules are to be found here and there on the lower surface of the first tibial joint, and even more sparingly on the femoral joint.

Type and distribution.—One of two male specimens taken "from an anemone, probably *Metridium*, brought in by a 'dragboat' from deep water (60 fms.), Pacific Grove, March 31, 1925," by Mr. Ricketts has been selected as the holotype. It is slightly the larger of the two, and measures approximately: proboscis, length 3 mm.; greatest width, 1.2 mm.; length of trunk to base of posterior crurigers, 3 mm.; abdomen 0.9 mm. long. The largest specimen of this species at hand is a female, which is but very little larger than the type. It has the proboscis 3.5 mm. long by 1.5 mm. wide; and trunk 4, and abdomen about 1.1 mm. long (measurements approximate). Regarding it, Mr. Ricketts says, "The large female was taken June 24, 1925, in 40-50 fms., mud bottom, off Pt. Davenport, about 14 miles N.W. of Santa Cruz on an anemone or *Polynices* shell.

"It is interesting to note that *Pycnogonum stearnsi* occurs almost invariably on *Metridium* on wharf piling, on barnacles that also have *Metridium*, or on *Bunodactis* in the tide pools; whereas the other larger [new] species of *Pycnogonum* seems to occur also in connection with *Metridium*, but entirely on the giant *Metridium* from deep water. Ecologically, as well as taxonomically, it would appear that these two *Pycnogonum*s are closely related, since the mud bottom association of deep water is most closely related to the wharf piling associations of the intertidal zone."

There is still a fourth specimen of this species in our collections, also collected and donated by Mr. Ricketts, from Pacific Grove, 1927.

Remarks.—*P. rickettsi* seems to be the only reticulated *Pycnogonum* known at present, in which the spines, or processes on the first three trunk segments, are individually much stronger than, and considerably exceed the ocular tubercle in height. *P. cataphractum*, in which the first of the median processes is larger than the ocular tubercle, is at once set apart by its very spiny legs.

In *P. mucronatum* the median row of spines or processes topping the trunk

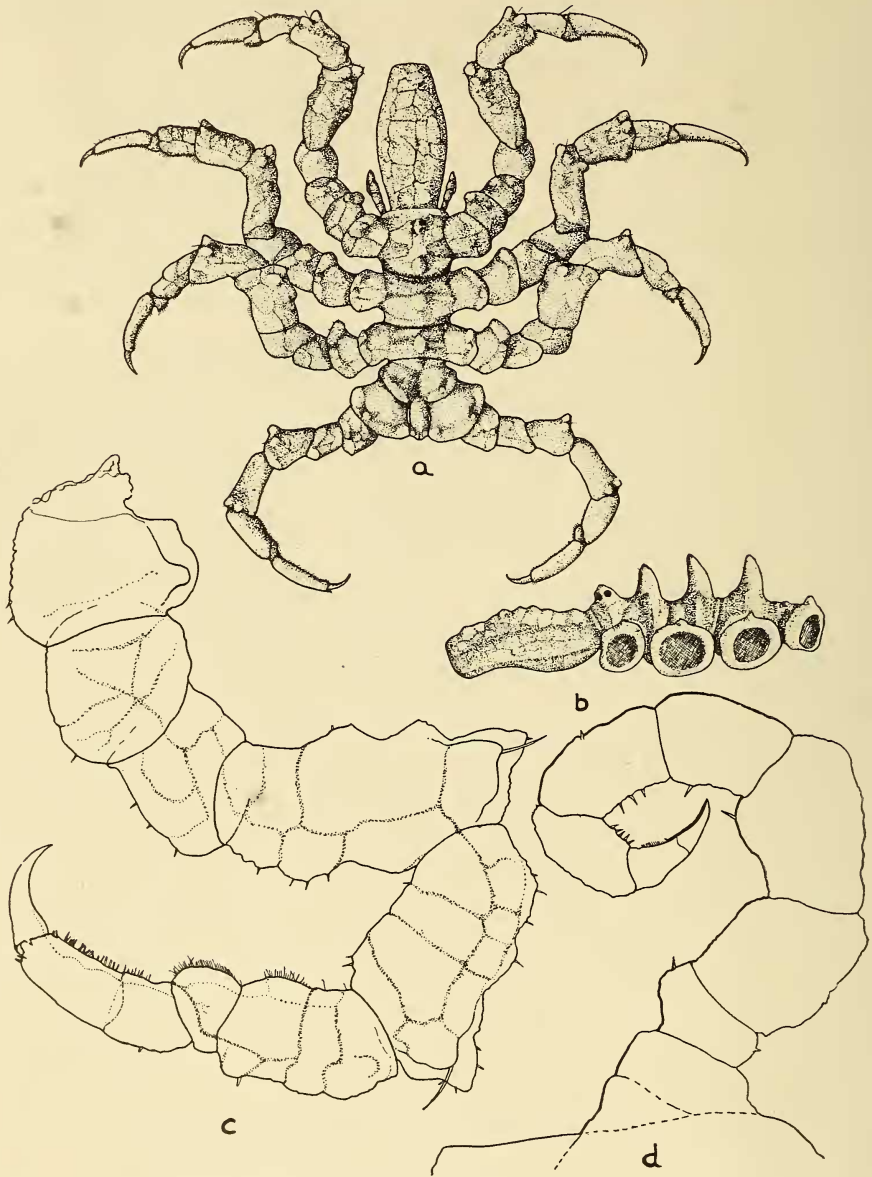


Fig. 1.—*Pycnogonum rickettsi*. a, Dorsal view of holotype, \times about 8; b, Lateral view; c, Third right leg, \times about 29; d, Ovipositor, \times about 60.

segments are more or less subequal in height with the ocular tubercle, they may slightly exceed it but they are much less stout, indeed feeble in comparison; moreover, the very long slender spine-like processes topping the distal upper margins of the crurigers are quite distinctive of this species and readily set it apart from all others.

P. madagascarensis, which, regrettably, seems never to have been figured, has its proboscis in the shape of a truncate cone like *P. mucronatum*, but the median dorsal tubercles are low and not so elevated and columnar-appearing as in that species, while spines or tubercles on the crurigers above seem to be wholly wanting.

Pycnogonum hancocki, new species

A very striking reticulated species of light tan, with reticulation a deep rich red-brown color, contrasting sharply with the bright white articulating ends of the various joints. The ocular tubercle forms quite a conspicuous feature in the color pattern of this species because of its darker coloration and greater concentration of brown. This is due chiefly to the presence of the dark brown pigmented eye-spots and to the fact that two of the dark brown lines forming the reticulations divide the ocular tubercle roughly into four quarters.

The proboscis is subcylindrical, truncate, and a little narrower anteriorly than posteriorly. It is about $2\frac{1}{4}$ times as long as its greatest width. In length the proboscis is very slightly longer than the first two and half the third trunk segments taken together. The first trunk segment is equal in length to the second, third, and fourth taken together; its greatest width over the outermost angles of the crurigers equals the combined length of the first, second, and about a fourth of the third trunk segments taken together. The greatest width of the second segment is equal to the length of the first two trunk segments taken together. The third segment is about as wide as the length of the first trunk segment plus one-third the second. The posterior pair of crurigers are fused for a part of their length. The abdomen is about two-fifths the proboscis in length.

In line behind the only moderately high, rounded ocular tubercle are three rounded tubercles, each smaller and less robust than the ocular; of these the third on the third trunk segment is the larger; the first is situated on the hinder margin of the first trunk segment; the second of these three tubercles is but little larger than the first and, like it, is placed on the hinder margin of its, the second, segment. On the dorsum of the last trunk segment there is no eminence or raised place worthy of comment, under a higher magnification there appears to be a very slight elevation or swelling at about the midpoint of the center line.

The distal margins of the crurigers seem to be rather inconspicuously, slightly nodulated, or perhaps just a bit more coarsely granulated, than the rest of the body surface. The distal margins of the first coxae of all the ambulatory legs seem little swollen, there being a tiny nodule or tubercle either side of the brown line of the reticulations which divides the white area into two; at about the distal mid portion of the proximal half of the second coxae of the second and third legs there is a single small nodule of comparable size, the second coxa of the first leg seems without a trace of nodulation, while the second coxae of the fourth pair each carry a pair of

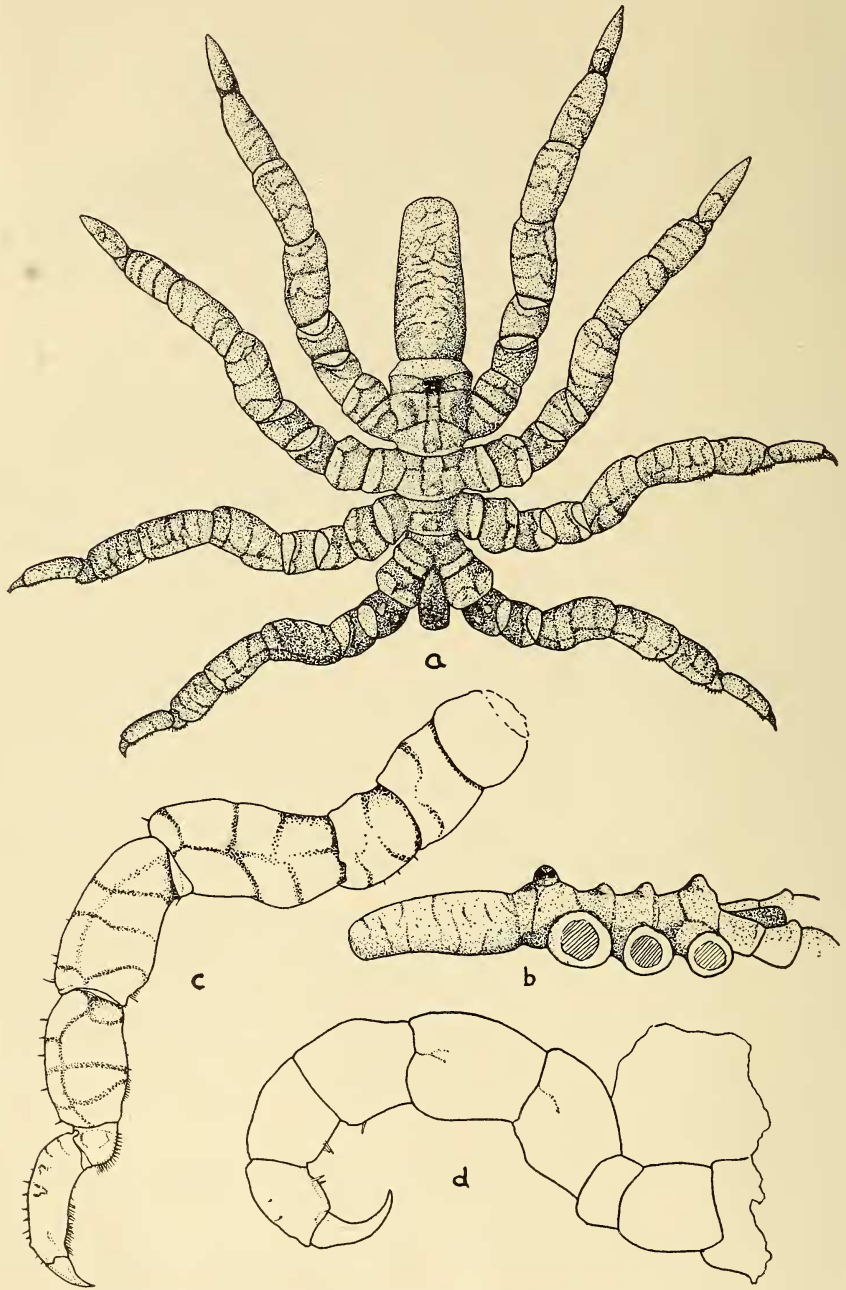


Fig. 2.—*Pycnogonum hancocki*. a, Dorsal view of holotype, \times nearly 9; b, Lateral view; c, Third right leg, \times about 19; d, Oviger of male, \times about 70.

nodules or noticeable small rounded tubercles, one on the middorsal line, and the other transversely in line and a little behind the median axis of the coxa. The remaining joints of the ambulatory legs are rather uniformly finely granulate, as is the entire animal.

In the third right leg the three coxal joints are more or less sub-equal in length as are the femoral and the first tibial joints approximately; the second tibial joint and the second tarsal exclusive of the terminal claw are also of about the same length; measured on the ventral margin, the first tarsal joint is very little longer than the terminal claw; the second tibial joint is about two-thirds the length of the first, and either two coxal joints are equal to three-fourths the femoral joint in length. Much as in the preceding species, the inferior borders of the tarsal joints are finely spinulate, and to a lesser extent the tibial joints near their distal ends only.

Type and distribution.—The largest of four specimens before me, a female, has been taken as the type. It was taken Feb. 9, 1933, in company with a somewhat smaller male carrying eggs on its ovigers at Sta. 65, Hancock Galapagos Expedition, at low tide from a small rocky reef, offshore, north of Tagus Hill, Albemarle Island, Galapagos, latitude 0°14' S. It measures approximately: proboscis 2.4 mm. long by 0.9 mm. wide; trunk, exclusive of posterior crurigers, 2.6 mm. long; and abdomen 1.0 mm.

The two other specimens at hand, both females, were taken respectively at Chatham Island, January 31, 1933, in the course of dredging in 2-3 fathoms east of Wreck Bay; and during shore collecting along the rocky shore east of Cormorant Point, Charles Island, Galapagos, February 6, 1933.

Remarks.—*P. hancocki* is one of the reticulated species of *Pycnogonum* belonging to the group having a few tubercles on the ambulatory legs. From the species so grouped, *P. indicum*, *madagascarensis* and *mucronatum*, it differs, in the case of the first, among other characters, in lacking the armed ridge running back from the ocular tubercle, and in having a subcylindrical proboscis instead of a decided conical one; the proboscis of *P. madagascarensis*, like that of *P. indicum*, forms an obtuse cone; in *P. mucronatum* the height of the median dorsal tubercle of the trunk serves to differentiate it from *P. hancocki*, aside from the fact that the former has long slender spinous or tubercular processes on the crurigers which are wholly lacking in the latter. The very low dorsal tubercles of the trunk segments of this species seem rather unique among the reticulated *Pycnogonums*, particularly those with legs comparatively or almost wholly free of noticeable tubercles.

NYMPHON GROSSIPES (Fabr.)

On occasion of a reconnaissance in the Bering Sea in the furtherance of the National Geographic Society's interest in the possibilities of aerial Arctic exploration, Capt. R. A. Bartlett made a number of dredgings for marine invertebrates. In one haul made about fifteen miles north of Big Diomedé Island, Bering Strait, June 14, 1924, two specimens of *Nymphon grossipes* were obtained. The only previous records of this species off the West American coast are those of John

Murdoch at Point Franklin in $13\frac{1}{2}$ fathoms and at the head of Norton Sound, Alaska, in 5 fathoms, respectively August 31 and September 12, 1883.

PHOXICHILIDIUM FEMORATUM (Rathke)

A very ragged, yet identifiable, specimen of this species was received from the U. S. Biological Survey as a part of the stomach contents of *Histrionicus histrionicus pacificus* Brooks, the Pacific harlequin duck, collected by A. M. Bailey Sept. 1, 1920, at Stephens Passage, Alaska. At the time of its receipt, the specimen represented a noteworthy eastward and southward extension of the range for the species, which heretofore on the west coast of America had only been known to range from Unalaska to Orca (Cole). However, I have also had occasion to determine another specimen of this species from much farther south, from Ucluelet, Vancouver Island. This specimen is listed a second time below as one of the pycnogonids seen from British Columbia.

AMMOTHEA LATIFRONS Cole

A portion of fragments of sixteen specimens of this pycnogonid were determined for the Biological Survey from the stomach contents of the Pacific harlequin duck, *Histrionicus histrionicus pacificus* Brooks, taken by P. A. Tavener at Kiska Island, Aleutians, April 16, 1924.

AMMOTHEA PRIBILOFENSIS Cole

This species has been determined from stomachs of *Histrionicus histrionicus pacificus* Brooks, the Pacific harlequin duck, as well as *Somataria v-nigra* Gray, the Pacific eider, on several occasions in quantities of one to three specimens. The birds in which these identifiable specimens were found were secured by G. Dallas Hanna on St. Paul Island, Pribilofs, January 13 and 29, 1918, and Mar. 21, 1915.

In several other specimens of each of these two ducks, fragments of pycnogonids which could not be definitely named were found, as well as in a pigeon guillemot, *Cephus columba* Pallas, also obtained by Dr. Hanna on St. Paul Island, Dec. 9, 1914. Hydroids of at least two species were found in the stomachs of several of the birds from which pycnogonids were sorted at the Survey. The remarkable variety of marine animals eaten by the ducks at least would indicate that the pycnogonids were very probably ingested along with the hydroids, some algae, crustacea, mollusks, echinoderms, and the like, which form the bulk of their varied fare.

PYCNOGONIDS FROM MONTEREY BAY, CALIFORNIA

As it may be of some interest, a list of the Monterey Bay pycnogonids that were identified a few years ago for Mr. E. F. Ricketts of the Pacific Biological Laboratories is here appended. Eight species are to be recorded from the region:

ANOPLODACTYLUS ERECTUS Cole, 1 specimen, collected in 1927, "from compound ascidians far out; tide pools."

HALOSOMA VIRIDINTESTINALIS Cole, 16 specimens, chiefly taken in 1928, "from wharf piling, *Obelia* colonies."

AMMOTHEA LATIFRONS Cole, 2 specimens "from 80 fathoms," received in 1928. These specimens seem to be of a somewhat more slender build as regards the appendages, eye-tubercle, and abdomen than most of those available for comparison from farther north. However, one from Sanborn Harbor, Nagai, Alaska, determined by Leon J. Cole, appears so well to link the California specimens to the species that I have so identified them in spite of what appears to be a very considerable extension of range southward.

AMMOTHELLA TUBERCVLATA Cole, 1 young specimen, received 1927.

LECYTHORHYNCHUS MARGINATUS Cole, 3 specimens, data as for *A. erectus* above.

TANSTYLUM INTERMEDIUM Cole, 2 specimens, received in 1927.

PYCNOGONUM STEARNSI Ives, 9 specimens received in 1927. One of specimens was found on an anemone.

PYCNOGONUM RICKETTSI Schmitt, specimens and occurrence as given with the description of the species above.

PYCNOGONIDS FROM SOUTHERN CALIFORNIA

AMMOTHELLA BI-UNGUICULATA Dohrn, 3 specimens from San Pedro (Pt. White), collected by E. P. Chace, May 5, 1919.

AMMOTHELLA SPINOSISSIMA Hall, 1 specimen, as above, May 18, 1919.

PYCNOGONUM STEARNSI Ives, 13 specimens, collected by E. P. Chace; three males, one female, from tide pools, Point Fermin, Mar. 28, 1918; and three males, six females, from mussels, north of Santa Monica, Nov. 17, 1918.

PYCNOGONIDS FROM BRITISH COLUMBIA

From Ucluelet, Vancouver Islands, W. Spreadborough, May-July, 1909, sent in pycnogonids of four species for identification, while a fifth but tentatively determined was taken from Virago Sound, Queen

Charlotte Island, from 8–15 fathoms by M. Dawson, 1878. The specimens seen are as follows:

PHOXICHILIDIUM FEMORATUM (Rathke), 1 specimen.

AMMOTHEA GRACILIPES Cole, 4 specimens.

AMMOTHELLA TUBERCULATA Cole, 5 specimens.

? AMMOTHEA ALASKENSIS Cole, 1 specimen; close to if not identical with this species; from hydroids.

SCIENTIFIC NOTES AND NEWS

Prepared by Science Service

NOTES

National Academy of Sciences.—A number of contributions were made by Washington scientists at the autumn meeting of the National Academy of Sciences at Cambridge, November 20 to 22. Dr. F. E. WRIGHT announced new data obtained in polariscopic examination of moonlight, and their bearing on the problem of the nature of the lunar rocks. Dr. C. G. ABBOT spoke on his recent discovery of a 23-year weather cycle, and its correlation with periods of sun-spot maxima. Dr. ARTHUR E. MORGAN, director of the Tennessee Valley Authority, delivered the principal evening lecture, on *Muscle Shoals and the Tennessee Valley Problem*. Dr. JOHN C. MERRIAM presented a review of the present status of the problem of the antiquity of man in North America. Gen. GEORGE O. SQUIER discussed a proposal for a combined sound and light distributor.

National Institute of Health.—Researches at the National Institute of Health and at the Rockefeller Institute for Medical Research in New York City indicate that encephalitis patients develop immune bodies in their blood. In both investigations a virus-susceptible strain of mice was used. The animals were inoculated with material from the brains of encephalitis victims, producing typical symptoms. But susceptible mice given preliminary injections of blood serum from encephalitis patients were protected from the disease.

The Colorists organized.—The artistic, commercial, scientific, and other aspects of color will be the concern of an informal group organized under the name of *The Colorists*. While color enters into many activities of daily life and is of interest to groups of artists, physicists, and industrialists in many aspects, Washington has not heretofore had a society whose primary object was color in all of its many aspects. At the organization meeting held at the Cosmos Club, CHARLES BITTINGER, Washington artist who has made a scientific study of color, presided. Miss DOROTHY NICKERSON, color expert of the Bureau of Agricultural Economics of the Department of Agriculture, was also one of the leading organizers. Among those who participated in the formation of the organization were Dr. E. C. CRITTENDEN, assistant director of the U. S. Bureau of Standards, and Mr. A. E. O. MUNSELL of the Munsell Research Laboratory, Baltimore, Md., who has been a leader in the commercial standardization of color. The U. S. Bureau of Standards was also represented by Dr. K. S. GIBSON, Dr. DEANE B. JUDD, R. T. MEASE, J. T. BREWSTER, WILLIAM D. APPEL, R. S. HUNTER, Dr. PERCY A. WALKER,